CONNECTICUT DEPARTMENT OF ENVIRONMENTAL PROTECTION
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CONNECTICUT'S NITROGEN CONTROL PROGRAM

WASTE LOAD ALLOCATION PLAN

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Nitrogen Reductions Necessary to Control Hypoxia in Long Island Sound through Waste Load Allocations

What Is Being Proposed?

*The Connecticut Department of Environmental Protection (CT DEP), in cooperation with New York State Department of Environmental Conservation (NYSDEC) and the federal EPA, has been investigating water quality problems in Long Island Sound through the National Estuary Program's Long Island Sound Study (LISS). Through those efforts, nitrogen has been identified as the primary pollutant causing low dissolved oxygen (DO) conditions, or **hypoxia**, that occur throughout much of the Sound's bottom waters each summer. Nitrogen fuels the growth of algae in the Sound, which eventually decays, consuming oxygen in the process. There is enough nitrogen added by human activity to cause severe hypoxia problems each summer, often with DO levels falling below 1 or 2 mg/l.*

To address the hypoxia problem, Connecticut and New York have developed a Total Maximum Daily Load (TMDL) analysis for nitrogen. The TMDL that specifies the maximum amount, i.e., the Total Maximum Daily Load, of nitrogen that can be discharged to Long Island Sound without significantly impairing the health of the Sound. Under the federal Clean Water Act, a TMDL analysis must be undertaken for waterbodies that do not meet state water quality standards. In the case of Long Island Sound, Connecticut's dissolved oxygen standard of 6.0 mg/l is violated each summer in the bottom waters from New Haven west to Greenwich. Similarly, New York's standard of 5.0 mg/l is violated in the western half of the Sound.

What are the Components of a TMDL?

A TMDL must specify where the pollutant of concern is coming from and what reductions are necessary to improve surface water quality. CT DEP, working through the Long Island Sound Study (LISS) has detailed nitrogen loadings from throughout the Long Island Sound watershed. The sources of nitrogen are well understood and are dominated by sewage treatment plant contributions.

*The Long Island Sound TMDL specifies how much nitrogen sewage treatment plants and other point sources in CT and NY will be allowed to discharge, known as a **Wasteload Allocation (WLA)**. Similarly, nitrogen reductions from nonpoint sources, such as urban stormwater runoff and atmospheric deposition, are specified. The nonpoint source maximum allowable load in the TMDL is called a **Load Allocation (LA)**.*

*The TMDL must also account for seasonal variations and incorporate a **Margin of Safety** to assure water quality standards will be met. Collectively, the TMDL is equal to the point source wasteload allocation plus the nonpoint source load allocation plus the margin of safety.*

How much Nitrogen will be Removed?

The TMDL, which was approved by the USEPA in April 2001, specifies a 58.5% reduction in human generated nitrogen from point and nonpoint sources as the next phase of management. Connecticut proposes to remove about 6,670 tons of nitrogen each year delivered to Long Island Sound from 81 municipal, state, and private sewage treatment plants and three industrial dischargers located throughout the state that contribute significant loads of nitrogen. Another 400-ton nitrogen reduction is planned for nonpoint sources. New York's expected nitrogen load reduction from point and nonpoint sources will be about 17,150 tons/year.

The WLA, to be fully implemented by 2014, will require municipal sewage treatment plants to remove about 64% of the total nitrogen in their effluents from the established baseline.

Is 58.5% Nitrogen Control Enough?

No. Additional phases of nitrogen reduction from sources in other states north of Connecticut that drain to Long Island Sound and from atmospheric sources are also proposed in the TMDL. However, it is unlikely that the WLA allocation will be increased to meet additional nitrogen reduction needs. Alternative technologies, such as aeration in the Sound, are being considered and it is likely that existing state water quality standards for dissolved oxygen will also be modified. Long Island Sound Study sponsored research shows that oxygen levels as low as 3.5 mg/l may be adequate to protect most aquatic life in Long Island Sound provided they do not persist for an extended period. CT DEP proposed to revise its marine DO criteria based on an EPA criteria document that was recently published.

What Will the TMDL Require My Town To Do?

The municipalities throughout Connecticut will be required to meet reductions assigned to each sewage treatment plant in the Wasteload Allocation (WLA) process. CT DEP held public meetings and solicited formal comments through a public notice in the late summer of 2000. Municipal officials had the opportunity to review the proposed WLA for their town's treatment plant and heard about the WLA derivation and rationale at public meetings in their area. The comments received were reviewed, appropriate revisions to the individual WLAs were made and the final list was adopted. Those loads formed the WLA portion of the TMDL, as described above and were submitted to the USEPA for approval in January 2001. (All 76 municipalities with STPs will be required to meet the final wasteload allocation by the year 2014.) Interim load limits and construction schedules will need to be established for each municipal facility.

How Were the WLAs Developed?

The individual WLAs were developed from a total nitrogen loading analysis conducted by CT DEP and the LISS. Point source loads of nitrogen were estimated from best available monitoring data for each of six geographic zones in Connecticut. In order to equally assign those loads among the treatment plants in each zone, without bias caused by treatment efficiency differences from plant to plant, the nitrogen load for the entire state was distributed proportionately to each treatment plant's average flow for the years 1997 through 1999. This effectively starts each treatment plant at the same level of treatment regardless of their operational history and does not unfairly burden the more effective plants with a more stringent final limit or give treatment plants that had been poorly operated an undeserved break.

Will Plant Size and Distance from LIS Affect its WLA?

Plant size (discharge volume) obviously does make a difference in the amount of nitrogen discharged to the Sound. However, no individual treatment plant will be required to remove a higher percentage from their calculated baseline load than another regardless of size. In this way each treatment plant will only be required to address their contribution of nitrogen in a fair and equitable manner. Distance from Long Island Sound also makes a difference in how much nitrogen from a discharge pipe eventually impacts the Sound. However, the only way more distant dischargers can treat that portion delivered to the Sound is by removing nitrogen in a direct proportion at the end of the pipe. To accommodate plant size differences and to reduce inefficiencies from treating more distant sources with smaller effects on LIS, CT DEP has proposed a Nitrogen Credit Exchange program for consideration by the General Assembly. (See the fact sheet on Nitrogen Credit Exchange.)

Will the WLAs be Flexible?

The total nitrogen reduction specified in the WLA for the next phase of implementation, must be met. However, there are an infinite number of possible ways the total target can be met in Connecticut by exchanging nitrogen reductions among point and possibly nonpoint sources.

*A **Credit Exchange** for nitrogen is an attractive option that would allow the regulated community to decide whether to implement nitrogen controls or to purchase nitrogen credits from other communities treating to a level below their allocation. Some treatment plants can more cost-effectively remove nitrogen because of their size and design. In addition, the location of STPs determines how directly their nitrogen load affects the hypoxia in western LIS. Municipal dischargers willing to remove more nitrogen than their original allocation calls for could sell the excess reductions to a nitrogen credit exchange system. From there, the credits would be available for purchase by municipalities where nitrogen removal would be more costly than purchasing. Both sellers and buyers would benefit economically, and the dissolved oxygen improvement in the Sound would be the same as if each individual plant met its allocation.*

The CT DEP has proposed such a Credit Exchange program to ensure management costs are minimized. Similarly, exchanging between point and nonpoint sources could be implemented as part of the Nitrogen Credit Exchange program.

In general, nonpoint source controls are much more costly and the nitrogen load is dominated by point sources. Consequently, purchase of point source credits to offset nonpoint reduction requirements is an attractive way to reduce costs.

How soon will the next Phase of Nitrogen Removal be Implemented?

The TMDL was formally approved by the EPA in April 2001. The TMDL calls for 15 years with full implementation of this phase, including meeting the WLAs, by the year 2014. The TMDL also requires periodic review and updating at five-year intervals to incorporate revisions due to changes in any of the following areas. 1.) New water quality standards that are adopted, 2.) Better understanding of hypoxia in Long Island Sound from ongoing research and monitoring efforts, 3.) Enhancement of plans for following phases of management, and 4.) New management technologies that might accelerate nitrogen control at a lower cost. Although the TMDL was planned to begin implementation in August 1999, adoption of the TMDL was delayed until 2001. Despite the delay, the 15 year nitrogen reduction will still be met by 2014. Any additional planning, permitting, and implementation will be compressed into the first five years of implementation to keep the 15 year time frame on track,

Has any Progress been made in Nitrogen Control?

In earlier phases of nitrogen control, CT DEP, in partnership with several municipalities, has made great strides in reducing the nitrogen load to Long Island Sound. Fifteen sewage treatment plants in Southwestern CT have achieved more than a 25% reduction in their aggregate nitrogen load through a low-cost retrofit program. In 1996-1997 CT DEP awarded a record $250 million in Clean Water Fund loans and grants to upgrade sewage treatment plants, including major nitrogen removal projects in Norwalk, New Canaan, and Waterbury. Since 1990, Connecticut has managed to reduce the statewide point source nitrogen load by an estimated 20% through cooperative state-municipal-private efforts.

For more Information...

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